

NAVPERS \_\_\_\_\_

TRAINEE'S GUIDE

FOR

U.S. NAVAL SUBMARINE SCHOOL, OPERATIONS ADVANCED TRAINING

AN/UGC-20/25 TELETYPE

MAINTENANCE COURSE

VOLUME I

SAFETY PRECAUTIONS

GRADING APPLICATION

LAB I

LAB II

LAB III

MAY 1971

DEPARTMENT OF THE NAVY  
Bureau of Naval Personnel  
Washington, D.C. 20370

FOREWARD

1. NAVPERS \_\_\_\_\_ Trainee's Guide for the AN/UGC-20/25 Teletype Maintenance Course, Class "C", is approved for use in the AN/UGC-20/25 Teletype Maintenance Course A-160-0064, and is effective upon receipt.

Director, Service Schools  
Training Division  
Bureau of Naval Personnel

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## SAFETY PRECAUTIONS

### GENERAL

The voltages encountered in electronic equipment are dangerous - DO NOT WORK ALONE.

1. All electronics personnel must read and become familiar with U.S. Navy Safety Precautions OPNAV 34P1 1953 (8 June 1953), changes 1 and 2 of 1955 and 1957 respectively and subsequent changes as issued.
2. The subject matter of articles 9670.281 through 9670.314 with the exception of articles 9670.290, 9670.307, 9670.309, 9670.311, 9670.313 and 9670.314 have been included in the various chapters of U.S. Navy Safety Precautions.
3. Safety from the view point of electronics personnel requires full appreciation of various factors and hazards involved: i.e., the precautions necessary in the work of the electrician (chapter 9600, section II); the special precautions due to the employment of power-supply circuits of 5,000, 20,000 and even 44,000 volts, or special precautions due to the use of even higher radio frequency potentials often much in excess of the power-circuit voltages indicated above; the effect of fields existing in the vicinity of antennas and antenna leads which introduce fire hazards, danger of shock to personnel, explosion hazards where ammunition or explosive vapors are present, and hazards (injuries due to falls) incident to men working aloft complicated by possible presence of stack gases and by possible shock, etc. Adequate safety features such as the use of suitable enclosures, provision for grounding, protective interlocks, etc., are required by specifications for electronic equipment, (Military specification MIL-E-16400 (Ships) Electronic Equipment, Naval Ship and Shore General Specification). Specifications for electronics installations require similar protective features or additional features such as the installation of protective coverings (rubber matting in accordance with Military Specifications MIL-M-15562 on deck areas which may be contacted by personnel engaged in operating and servicing radio, radar, sonar, or countermeasures equipment or associated test equipment where nominal voltage of 115 volts or greater are employed and on operating spaces in the front and rear of power and lighting switchboards. Regardless of efforts made during design and installation, safety depends on the user being continually aware of hazards and alert to guard against them.
4. Personnel must always remember that the removal of a unit or part from the normal location within an assembly and the energizing of the unit or part, while it is outside of the normal enclosure, removes the protection given by built-in protective features such as interlocks, grounds, and enclosures. Since the

safety features then no longer exist special precautions and safety measures must be taken.

5. The chassis and frame of all power supplies and high-voltage units removed for servicing shall be grounded, and all circuits normally grounded in operation shall be grounded whenever power is applied to the unit.

NOTE: Fire retardant nonconductive rubber matting in accordance with specifications MIL-M-15562 A or B is acceptable. The former-black corrugated stock is to be used until depletion. The B revision material for new installations and replacement has gray diamond pattern. A general purpose type (Spec ZZ-M-71A) black diamond is unsuitable conductive and nonfire retardant.

6. In addition to hazards referenced above an additional category now being investigated is in the field of microwave radiation hazards to personnel.

Scope of these safety precautions - additional instructions.

The safety precautions contained herein and those contained in equipment technical manuals and the U.S. Navy Safety Precautions comprise a nucleus for the promulgation of detailed instructions for the safe installation, maintenance, and operation of electronics facilities ashore and afloat. In the event of nonagreement between the safety precautions contained herein and those contained in equipment technical manuals and the U.S. Navy Safety Precautions, see article 01103 of OPNAV 34P1. Commanding Officers afloat and ashore shall issue such additional orders and instructions as are deemed necessary for the protection of personnel.

Dangerous voltages and currents.

1. Fundamentally, current rather than voltage, is the criterion of shock intensity. The passage of even a very small current through a vital part of the human body will cause DEATH. The voltage necessary to produce the fatal current is dependent upon the resistance of the body, contact conditions, the path through the body, etc. When a 60-cycle alternating current, for example, is passed through a man from hand to hand or from hand to foot and the current is gradually increased from zero it will cause the following effects: at about 1 milliampere (0.001 ampere) the

shock is perceptible; at about 10 milliamperes (0.01 ampere) the shock is of sufficient intensity to prevent voluntary control of the muscles and a man may be unable to let go and free himself; at about 100 milliamperes (0.1 ampere) the shock is fatal if it lasts for one second or more. The above figures are the results of numerous investigations and are approximate only because men differ in their resistance to electrical shock. It is imperative to recognize that the resistance of the human body cannot be relied upon to prevent a fatal shock from 115 or lower voltages-fatalities from as low as 30 volts have been recorded. Tests have shown that body resistance under unfavorable conditions may be as low as 300 ohms and possibly as low as 100 ohms from temple to temple if the skin is broken. Volt for volt DC potentials are normally not as dangerous as AC as evidenced from the fact that reasonably safe "let-go current" for 60 cycle alternating current is 9.0 milliamperes for men and 6.0 milliamperes for women while the corresponding values for direct current are 62.0 milliamperes for men and 41.0 milliamperes for women.

2. The voltages encountered in electronic equipment are dangerous. The actual value of the voltages involved are indicated in equipment technical manuals. The voltage encountered in receiver installations may be dangerous. Plate voltages up to 180 volts are used with battery operated receivers, and with AC line operated receivers higher voltages are used. The precautions herein shall be observed, insofar as they are applicable. Oscilloscope circuits employ voltages corresponding to those used in transmitting equipment. Therefore, similar safety precautions should be observed.

NOTE: Additional hazards may be introduced if personal radio or electronic equipment is used. In certain types of this equipment, the metal chassis or parts of the cabinet may be alive.

#### Warning signs and guards.

Warning signs and suitable guards should be provided to prevent personnel from coming in accidental contact with dangerous voltages, for warning personnel of possible presence of explosive vapors, for warning personnel (working aloft) of poisonous effects of stack gases, etc. Certain types of standard electronics warning signs are available for procurement from the Commander, Philadelphia Naval Shipyard. A list of signs that are



available has been distributed to all ships, commands and shore activities. Any warning signs not listed should be ordered on a separate requesting document. The following NAVSHIPS drawings have been prepared for activities wishing to make their own signs;

1. Drawing RE 10B 608B-Warning Regarding High Voltage.
2. Drawing RE 10AA 529A-Warning Regarding Stack Gases.
3. Drawing RE 10A 589A-Warning Regarding Explosive Vapors.
4. Drawing RE 10D 2282-Warning Regarding Radio Frequency Hazards.

#### Electrical Fires.

1. In case of electrical fire:
  - a. De-energize the circuit for equipment involved.
  - b. Sound alarm in accordance with station regulations or ship's fire bill.
  - c. Secure ventilation.
  - d. Report fire to officer of the day, or other designated duty officer by messenger or telephone in accordance with local instructions.
  - e. Attack the fire with equipment available in the immediate vicinity such as portable 15-pound Co2 extinguishers.
2. When extinguishing an electrical fire, it should be remembered that quick action is required only to de-energize the circuit. When this has been done-STOP! LOOK! THINK! The use of Co2 (carbon dioxide) fire extinguisher directed at the base of the flame is always best for all electrical fires.
3. Vaporizing liquid extinguishers although approved by the Fire Underwriters Laboratory for extinguishing an electrical fire create certain hazards when used. The material is toxic if breathed, absorbed or ingested and the thermal breakdown products are also toxic. The physiological effects are for the most part cumulative. For these reasons among others, this type of fire extinguisher is no longer permitted by the Navy. A solid stream of salt water or other conducting liquids when directed on energized electrical circuits is dangerous to personnel and extreme care must be exercised to use only fresh water and a fog or spray type applicator. Where voltages exceed

1000 volts, water should not be used on live electrical parts from portable extinguishers.

4. In case of cable fires in which the inner layers of insulation, or insulation covered by armor, support combustion, the only positive method of preventing the fire from running the length of the cable is to cut the cable after it has de-energized, and separate the two ends.

#### Electrical Shock-First Aid; Treatment; Resuscitation Methods.

1. All personnel shall familiarize themselves with the various methods of artificial respiration as shown in NAVMED publications, technical manuals for electronic equipments, and as noted in this article.
2. The American National Red Cross has just announced (July '59) the mouth-to-mouth (or mouth-to-nose) technique of artificial respiration as the most effective of the resuscitation techniques. This material has been published in the Electronics Information Bulletin Number 515, NAVSHIPS 9000,022A. It was taken from a recently published supplement to Red Cross Textbook on First Aid, First Aid Textbook for Juniors, Life Saving and Water Safety, and Teaching Johnny to Swim. It effectively presents the new method and also the former manual methods which are alternate resuscitation techniques for those who cannot or will not use the mouth-to-mouth method.
3. The Bureau of Medicine and Surgery plans to revise the Syllabus of Lesson Plans for First Aid Instructors, NAVMED P5056, to include the mouth-to-mouth technique. It is considered to be the most practical of all techniques. All ships and stations will automatically receive the revision as soon as it is published without request.
4. The effective and approved back-pressure arm lift, or Holger-Neilson method, supplanted earlier methods for artificial respiration. Two publications are available for instruction purposes. One pamphlet, the NAVMED P-5003, Artificial Respiration (Back Pressure, Arm Lift Method) and one poster suitable for bulkhead display, the NAVMED P-5002-A, Artificial Respiration, are available in the Navy supply system. Additional copies of each publication may be procured by submitting DD Form 1149 to the appropriate forms and publications supply distribution point.

5. At suitable intervals, the electronics or other cognizant officer shall require all personnel normally engaged in operation and maintenance of electronic equipment to demonstrate their practical knowledge of the application of artificial respiration and shall arrange for such additional training as may be necessary for all personnel to attain proficiency.

#### Work to be Done by Authorized Persons Only.

Because of the danger of fire, damage to material, and injury to personnel, all repair and maintenance work on electronic equipment shall be done only by duly authorized and competent persons. Where the work involves the use of voltage dangerous to life, personnel should not work alone.

#### Intentional Shocks Forbidden.

Intentionally taking a shock from any voltage is always dangerous and is strictly forbidden. Whenever it becomes necessary to check a circuit to see that it is alive, a test lamp, voltmeter, and other indicating device shall be used. The indicating device employed shall be suitable for obtaining the desired check without jeopardizing personnel. In the case of live circuits, never implicitly trust insulating material when considering personal safety. Treat all wiring as though it were bare of insulation. Insulating material has failed before and may fail again - be on the alert.

GRADING APPLICATION FOR ADJUSTMENT PHASE

I. There are (65) adjustment steps in LAB II.

A. On a grading scale of 100, each step (adj) counts 1.53.

1. 63 correct adjustments (2 uncorrected mals) - 96.94 or 100 minus (2 x 1.53).
2. 63 correct adjustments (2 corrected mals) - 98.47 or 100 minus (50% of 2 X 1.53).

B. Each broken/lost part, spring, etc., will count as an uncorrected mal.

II. There is 28 hrs, 10 mins time allotted for the adjustment steps in LAB II.

A. Time overlap up to 30 hrs is provided (30 hrs X 60 mins = 1800 mins).

B. 65 Adj steps/1800 mins - 27 mins per adj.

C. Net score is gross score minus time.

1. Where adjustments are complete in 30 hrs or less, net score is gross score.
2. Net score is not improved by completion of adj in less than 30 hrs.

D. Where time used exceeds time allowed (30 hrs) 27 mins per adj.

1. 28 min per adj - minus .01 of gross score
2. 29 min per adj - minus .02 of gross score
3. 30 min per adj - minus .04 of gross score
4. 31 min per adj - minus .06 of gross score
5. 32 min per adj - minus .08 of gross score
6. 33 min per adj - minus .10 of gross score

E. Students not completing LAB II in the Max allotted time of 38 hrs 30 min are subject to being dropped from the course for non completion.

GRADING APPLICATION FOR TROUBLE SHOOTING PHASE

- I. There is 28 hrs - 10 minutes provided for trouble shooting Phase LAB IV.
- II. There is a minimum of 40 troubles required for this phase. Grading will be on a TIME/METHOD basis.

A. TIME SCALE

0 - 3 mins.	-	100
3.5	-	98.5
4.0	-	97.0
4.5	-	95.5
5.0	-	94.0
5.5	-	92.5
6.0	-	91.0
6.5	-	89.5
7.0	-	88.0
7.5	-	86.5
8.0	-	85.0
8.5	-	83.5
9.0	-	82.0
9.5	-	80.5
10.0	-	79.0
10.5	-	77.5
11.0	-	76.0
11.5	-	74.5
12.0	-	73.0
12.5	-	71.5

GRADING APPLICATION FOR TROUBLE SHOOTING PHASE

II. CONT'D

13.0 mins.	-	70.0
13.5	-	68.5
14.0	-	67.0
14.5	-	65.5
15.0	-	64.0

B. Method (correct symptom)

1. Grade for each trouble will be marked down .02 (2%) for incorrect symptom.
2. Symptom description/examples:
  - a. Garbling, not printing correctly but no common misprints or malfunctions.
  - b. Running open (no signal line current)
  - c. Not resetting mechanically (is not running open)
  - d. Maladjustment (clearance out of tolerance)
  - e. Loose (not tight as required and not a maladjustment)
  - f. Missing (piece or part is not in/on machine)
  - g. Disconnected (hanging loose)
  - h. Normal line feed, line feed on ACR, but no single line feed (example of a symptom)

- C. 10 minutes is allowed for correcting trouble on your machine and ensuring machine is ready for next trouble.

## LAB I

**OBJECTIVES:** When you complete this phase of instruction, you will be able to, Select and use correctly the proper tools and accurately perform the following.

- I. Disassemble and Reassemble the Keyboard Base Unit.
- II. Disassemble and Reassemble the Automatic Typewriter
- III. Remove and replace electrical wires to the correct terminal points.
- IV. Make continuity checks in the electrical circuits and correctly analyze the readings on the meter.

### **MATERIALS:**

- I. Training Aids
  - A. AN/UGC-20 Teletypewriter Set (one each trainee)
  - B. Actual Wiring Diagrams
    1. 2900 WD
    2. 3214 WD
    3. 5976 WD
    4. 5977 WD
    5. 5978 WD
  - C. Locally prepared Schematics
- II. References
  - A. NAVSHIPS 0967-059-9010 (Bulletin 284B)
  - B. NAVSHIPS 0967-059-9020 (Bulletin 1197B)
  - C. Bulletin 259B
- III. Tools
  - A. Standard tool kit (one each trainee)
  - B. SIMPSON 269AF (one each trainee)

MATERIALS: contd

IV. Expendable supplies

- A. Electrical tape
- B. Solder
- C. Terminal Lugs
- D. Springs, Retainers and other small parts susceptible to loss and breakage during LAB work.

INTRODUCTION:

The purpose of these Job Sheets is to guide you in; Disassembly and Reassembly of the "KEYBOARD BASE UNIT" and "AUTOMATIC TYPER", and the Removal and Replacement of electrical wiring from TERMINAL BLOCKS & JUNCTION POINTS, plus aid you in developing methods of locating and isolating Electrical Problems in the AN/UGC-20.

INFORMATION:

There are four (4) JOB SHEETS in this phase, they are; DISASSEMBLY AND REASSEMBLY of the Keyboard Base Unit. DISASSEMBLY AND REASSEMBLY of the Automatic Typer. REMOVAL AND REPLACEMENT of wiring from Terminal Blocks. CONTINUITY CHECKS of the AC & DC circuits in the AN/UGC-20.

DIRECTIONS:

Follow instructions on each Job Sheet carefully, strictly adhere to all CAUTION points, upon completion of one Job Sheet DO NOT commence the next Job Sheet until directed by your instructor.



LAB I

PROCEDURES AND INSTRUCTIONS FOR:

- I. DISASSEMBLY AND REASSEMBLY OF THE KEYBOARD BASE UNIT
- II. DISASSEMBLY AND REASSEMBLY OF THE AUTOMATIC TYPER
- III. REMOVAL AND REPLACEMENT OF WIRING FROM TERMINAL BLOCKS AND JUNCTION POINTS
- IV. CONTINUITY CHECKS OF THE AC & DC CIRCUITS IN THE AN/UGC-20

I. Disassembly and Reassembly of the Keyboard Base Unit.

INTRODUCTION

The purpose of this job sheet is to guide you in disassembly and reassembly of the Keyboard Base Unit, required for preventive and corrective maintenance.

EQUIPMENT

AN/UGC-20 Teletypewriter Set

Standard Tool Kit

REFERENCES

NAVSHIPS 0967-059-9010, Section 573-116-703, pages 18 and 20  
Section 573-116-705, pages 1 and 3.

NAVSHIPS 0967-059-9020, Parts Manual

Bulletin 295B, Motor Unit, page 5.

TIME REQUIREMENTS

LAB I

JOB SHEET I

DISASSEMBLY

DIRECTIONS:

Perform the following job steps in the order given. OBSERVE all

CAUTION NOTES

JOB STEP

1. Remove the Automatic Typer from the Mounting base (PAN)
  - A. Remove Typer unit connector from "R" plug (mounted above magnetic selector)
  - B. Remove four base screws
  - C. Pick Typer up by frame
2. Remove the Keyboard Transmitter from the Pan (fig 1, page 2, section 573-116-1-2, NAVSHIPS 0967-059-9010)
  - A. Remove four mounting screws from bottom side
  - B. Uncouple "F" plug, KBD transmitter connector (left side of base)
  - C. Lift by side plates, DO NOT touch or damage contact wires

NOTE: There are 18 job steps, do not omit any of the steps in disassembly and reassembly.

LAB I

JOB SHEET I

DISTRIBUTOR ASSEMBLY

JOB STEP

1. Remove speed selector knob.
2. Remove motor (four base screws, two lugs from terminal block, pages 1 and 3, rear left view)
3. Remove terminal block mounting plate from gear assembly
4. Remove distributor drive shaft gear
5. Remove 4 screws holding distributor to base
6. Remove "F" plug from base
7. Remove distributor from base (CAUTION - use care in handling wiring)
8. Remove clutch magnet bracket, secured by 2 screws on left
9. Remove the distributor block assembly, (3 screws on front of block)
10. Remove large nut from left end of main shaft
11. Remove screw and bearing retainer from left end of main shaft
12. Remove two screws and bearing retainer from right end of main shaft
13. Remove screw from distributor clutch drum, push main shaft to right and remove shaft from clutch and cam sleeve
14. Place screwdriver in the right end of distributor frame, to the rear of the follower levers. Move and hold the follower levers to the front of the machine and remove cam assembly out of machine.

note; Steps 13 and 14 may have to be performed simultaneously.

LAB I

JOB SHEET I

THREE SPEED GEAR SHIFT.

JOB STEP

15. Remove retainer from collar and remove shift link
16. Move key to left and remove (CAUTION- key is spring loaded)

When you have completed all job steps inform the Instructor you are ready for a check out, before reassembly

NOTE: REASSEMBLY WILL BE IN REVERSE ORDER

II. Disassembly and Reassembly of the Automatic Typewriter

INTRODUCTION

The purpose of this job sheet is to guide you in disassembly and reassembly of the Automatic Typewriter, required for preventive and operational maintenance.

EQUIPMENT

AN/UGC-20 Teletypewriter Set

Standard Tool Kit

REFERENCE

NAVSHIPS 0967-059-9010, Section 573-115-702, pages 1 thru 7.

TIME REQUIREMENTS

LAB I

JOB SHEET 2

DISASSEMBLY

DIRECTIONS

Perform the following job steps in the paragraphs listed, and supplementary instructions where provide under CAUTION OR SPECIAL NOTES

READ AND UNDERSTAND PARA 1.01 thru 1.07 and 2.01

JOB STEP

CAUTION OR SPECIAL NOTES

1. Remove ribbon
2. Remove two bakelite paper spindle blocks
3. Remove Type Box - 2.02
4. Perform 2.03-----DO NOT remove any spring or pallets
5. Perform 2.05
6. Perform 2.07
7. Perform 2.08
8. Perform 2.11 (b)-----Remove rear nut on LF bar guide  
2.11 (c)  
2.11 (d) (2)-----Remove stripper blade after PN 153581,  
151637 & 155099  
2.11 (e)  
2.11 (f) -----Remove 160577 and 153295
9. Para 2.12 -----(remove PN 150544, unsolder black  
and red wire)
10. Perform 2.13

LAB I

JOB SHEET 2

JOB STEP

CAUTION OR SPECIAL NOTES

- 11. Perform 2.14
- 12. Perform 2.15
- 13. Perform 2.16
- 14. Perform 2.20
- 15. Perform 2.21
- 16. Perform 2.35 -----To meet requirements, insert a .035" allen wrench in hole of Marking Lock lever after first hole clears Marking Lock lever guide.
- 17. Perform 2.37 -----Remove 4 wires from selector magnets
- 18. Perform 2.23 -----(2.23 (g) Link slides off, after retainer plate has been removed without removing or loosening any other screws)  
(2.23 (k) Remove two screws which secure main rocker shaft drive bracket to main rocker shaft.
- 19. Perform 2.26
- 20. Perform 2.27

NOTE: Upon completion of step 20 inform Instructor that you are ready to be checked before Re-assembly



LAB I

JOB SHEET 2

REASSEMBLY MOST STEPS WILL BE IN REVERSE ORDER OF DISASSEMBLY

JOB STEP

CAUTION OR SPECIAL NOTES

1. Perform 2.28
2. Perform 2.24
3. Perform 2.37
4. Perform 2.35
5. Perform 2.22
6. Perform 2.20
7. Perform 2.13, 2.14, 2.15, 2.16
8. Perform 2.11 -----Ensure blocking slide is blocking  
function bars 12 and 13, unblocking  
functions bars 39 and 40.  
Read para 2.17 and 2.18
9. Resolder wires to stunt box switch
10. Perform 2.09
11. Perform 2.07
12. Perform 2.06
13. Perform 2.04

**NOTE: DO NOT REPLACE: RIBBON, SPINDLE BLOCKS**

RECHECK ALL STEPS FOR ACCURACY AND INFORM INSTRUCTOR YOU ARE READY  
FOR A FINAL CHECK

14. AFTER CHECK OUT BY INSTRUCTOR REPLACE SPINDLE BLOCKS

III. REMOVAL AND REPLACEMENT OF WIRING FROM TERMINAL BLOCKS  
AND JUNCTION POINTS

INTRODUCTION

The purpose of this job sheet is to guide you in locating certain Electrical Junction and Terminal points and to help you develop methods of locating and isolating electrical problems in the AN/UGC-20.

EQUIPMENT

AN/UGC-20 Teletypewriter Set

Standard Tool Kit

SIMPSON 269AF

REFERENCES

Teletype Actual Wiring Diagrams

- A. 2900 WD
- B. 3214 WD
- C. 5976 WD
- D. 5977 WD
- E. 5978 WD

Locally Prepared Schematics

TIME REQUIREMENTS

REMOVAL OF WIRING

DIRECTIONS

Perform the following job steps listed below, in the order given - CAUTION - observe safety procedures common to all electrical circuits as found in NAVSHIPS 9670 Section V and as follows:

- A. Do not perform any of the job steps with AC or DC power plugs in respective receptables.
- B. Never take continuity checks in OHMS scale with any power applied to the equipment.

JOB STEPS

- 1. Remove all wires from terminal block "P" do not lose any screws
- 2. Remove all wires from terminal block "K"
- 3. Remove all wires from terminal block "S"

When you have all wires removed, inform Instructor you are ready for a check out

REPLACEMENT OF WIRING

DIRECTIONS

Perform the following job steps listed below, in the order given -  
CAUTION - carefully observe color codes (5976 WD)

JOB STEPS

1. Replace all wires to terminal block "P"
2. Replace all wires to terminal block "K"
3. Replace all wires to terminal block "S"

NOTE: When you have replaced all wires to their terminal blocks, RECHECK all color codes for correct connections and inform instructor you are ready for a check out.

CAUTION DO NOT under any circumstances place machine under power until told to do so by instructor.

IV. CONTINUITY CHECKS of the AC & DC Wiring Circuits  
in the AN/UGC-20.

INTRODUCTION

The purpose of this job sheet is to aid you in developing a logical method of locating and isolating Electrical Problems in the AN/UGC-20.

EQUIPMENT

AN/UGC-20 Teletypewriter Set

Standard Tool Kit

SIMPSON 269AF

REFERENCES

Teletype Actual Wiring Diagrams

- A. 2900 WD
- B. 3214 WD
- C. 5976 WD
- D. 5977 WD
- E. 5978 WD

Locally prepared Schematic

TIME REQUIREMENTS

CONTINUITY CHECKSDIRECTIONS

Perform the following job sheets listed below, in order given,  
CAUTION - insure that AC & DC power is not connected to your  
equipment before touching test leads of Test Equipment to  
Check Points, ALL CHECKS WILL BE MADE WITH METER IN OHM'S POSITION.

NOTE - When completing one job step, replace all wires and fuses  
before proceeding to the next job step.

JOB STEPS

1. Remove wire (w)-P2 & wire (BK)-P1, DC signal line  
from power supply or external source, and AC input  
from S2 & S4
2. Remove wire (w/br)-P1, (open P1 to Y-L)
3. Remove wire (w/p/bk)-P2, (open P2 to G2)
4. Remove wires (g & w/g)-P3, (open G7 to LP-1)
5. Remove wire (o)-P4, (open S2 to A1)
6. Remove wire (bk)-K3, (open H2 to S2, with F2 removed)
7. Remove wires (2) (w)-H4, (open S4 to Z6)
8. Remove wires (2) (s)-H3, (open H4 to S1, with F2 removed)

Upon completion of the above job steps, insure all wires have  
been replaced correctly, by checking color code with 5976 WD,  
inform Instructor you are ready for a checkout.

## LAB II

### OBJECTIVES

When you complete this phase of instruction you will be able to:

- I. Locate and identify parts of the AN/UGC-20 in the parts manual, cross reference parts in the APL and find the FSN for these part numbers.
- II. Perform selected mechanical adjustments in the AN/UGC-20, using procedures in the adjustment section of the Technical Manual, develop good maintenance and adjustment techniques. Complete adjustments in the specified time limits and meet the tolerance requirements of all adjustments.
- III. Observe safety precautions common to all electro-mechanical machines and electrical safety precautions as listed in NAVSHIPS 9670 Section V.

### MATERIALS

- I. Training Aids: AN/UGC-20 Teletypewriter set (one each Trainee)
- II. References:
  - A. NAVSHIPS 0967-059-9010, Section 573-115-700
  - B. NAVSHIPS 0967-059-9020
  - C. Adjustments guide Job Sheets
- III. Tools: Standard Tool Kit (one each trainee)
- IV. Expendable supplies
  - A. Electrical tape
  - B. Springs
  - C. C-ring retainers
  - D. Small screws and nuts, susceptible to loss or stripping.

## LAB II

### INTRODUCTION

The purpose of these Job Sheets is to guide in: The Mechanical Adjustments of the AN/UGC-20 and to aid you in developing logical and sequential adjustment procedures. Another purpose is to provide graded application.

### INFORMATION

There are three JOB SHEETS in this phase. They are:

KEYBOARD BASE UNIT ADJUSTMENTS  
AUTOMATIC TYPER I ADJUSTMENTS  
AUTOMATIC TYPER II ADJUSTMENTS

### DIRECTIONS

Follow instructions on each Job Sheet carefully; strictly adhere to all CAUTION points; upon completion of one job sheet do not commence the next job sheet until directed by your instructor. The adjustable components listed in each job sheet will be maladjusted under the guidance of, or by, an instructor. You will then proceed to make the adjustments following the step-by-step procedures listed on the job sheets and Technical Manual (NAVSHIPS 0967-059-9010). When working on Job Sheets you may request help from the instructor as necessary, but you are encouraged to do as much work as possible on your own.



## LAB II

### GENERAL PROCEDURES

The adjustable point listed on each job sheet will be maladjusted (thrown out) as the first step. You will then proceed to properly readjust your machine following the instruction on the job sheets and the Technical Manual. Some items are not thrown out, however, you will be responsible for their accuracy. You will be assigned a maladjustment (MAL) for each incorrect adjustment.

A throw out may affect several trains of parts, therefore it may be impossible to set the machine to the condition required in the Technical Manual. You should first go over the entire job sheet and make approximate settings, tighten loose nuts, screws, etc. After you have done this and the machine is workable when turned over by hand, then you will be able to set it up for the required condition and readjust to the tolerance required.

All job sheets call for a preliminary check. If a MAL is not pointed out and your machine is free of binds you may proceed with the final portion of the job sheet and/or operate your machine under power. Should a MAL or a bind be pointed out, it must be corrected and a re-preliminary check made by an instructor. Under no circumstances will you operate your machine under power without a preliminary check. Final checks will be made in a similar manner. MAL's will be corrected and rechecked before proceeding. In case a recheck turns up another MAL, of the same or other adjustments affected by it, you will be required to adjust it and obtain another recheck. A MAL for each broken part will be assigned by the instructor.

If a replacement part is required to put your machine in operating order or being replaced due to excessive wear, you will look up the part number in the appropriate NAVSHIPS Manual, (List of Maintenance Parts), and fill out parts request chit and give it to **an instructor** and he will draw the required part.

Included with each job sheet is a list of CAUTION POINTS. Practical information, and helpful hints. Only those items which experience has shown to be difficult are listed. In many cases, you will find that questions you might have asked are answered here. You are encouraged to use your own methods and ingenuity in making adjustments. The CAUTION POINTS should be followed closely to avoid difficulty and/or damage to your machine. In most cases, disregarding a CAUTION POINT will earn you a MAL.

LAB II

PROCEDURES AND INSTRUCTIONS FOR

- I. ADJUSTMENTS TO THE KEYBOARD BASE UNIT
  - A. Keyboard Transmitter
  - B. Distributor and 3 speed Gear Shift
- II. ADJUSTMENTS TO THE AUTOMATIC TYPER I
- III. ADJUSTMENTS TO THE AUTOMATIC TYPER II

LAB II

JOB SHEET 1

I. Adjustments for the Keyboard Base Unit

INTRODUCTION

The purpose of this job sheet is to guide you in performing selected adjustments in the Keyboard Base Unit, required for preventive and corrective maintenance.

EQUIPMENT

AN/UGC-20 Teletypewriter Set

Standard Tool Kit

REFERENCES

NAVSHIPS 0967-059-9010, Section 573-116-703

LAB II

JOB SHEET 1

ADJUSTMENTS

DIRECTIONS

Perform the following job steps in the order given. Observe all CAUTION Notes.

JOB STEPS

1. Read and Understand - Para 1.01 through 1.08, page 2, Section 573-116-703, NAVSHIPS 0967-059-9010.
  2. Remove Automatic Typewriter from KBD Base. KBD Transmitter from Pan.
  3. Perform KBD Transmitter positioning - 2.06 (Insure that the repeat keylever will hit the plunger on the microswitch pg 11 of Section 573-116-102).
  4. Perform Reset Arm - 2.05 (Make this adjustment with the right end of KBD transmitter held up away from work bench. Push plunger as far to right as possible with finger).
  5. Universal Link - 2.01 (CHECK ONLY)
  6. Contact wires - 2.01 (CHECK ONLY)
  7. Universal contact - 2.06 (CHECK ONLY)
- \*\*RE-CHECK ADJUSTMENTS AND PLACE NAME ON BOARD FOR CHECK OUT\*\*
8. Perform - 2.07 (Clutch trip lever & Armature extension)
  9. Perform - 2.08 (Follower lever must ride fully on the cams when moved from side to side. Insure that bracket is as far to rear as possible and aligned parallel with frame)
  10. Perform - 2.10
  11. Perform - 2.11 (CHECK ONLY)
  12. Perform - 2.12
  13. Perform - 2.13

LAB II

JOB SHEET 1

ADJUSTMENTS Cont'd

JOB STEPS

14. Perform - 2.16 (CHECK ONLY)

15. Perform - 2.17

16. Perform - 2.18

**\*\*NOTE\*\*** WHEN REPLACING KEYBOARD TRANSMITTER, INSURE RESET SOLENOID WIRES ARE NOT TOUCHING FRAME

**\*\*NOTE\*\*** RECHECK ALL ADJUSTMENTS, PLACE NAME ON BOARD FOR PRELIMINARY CHECK.

LAB II

JOB SHEET 2

II. Adjustments for the Automatic Typewriter I

INTRODUCTION

The purpose of this job sheet is to guide you in performing selected adjustments in the Automatic Typewriter, required for preventive and corrective maintenance.

EQUIPMENT

AN/UGC-20 Teletypewriter Set

Standard Tool Kit

REFERENCES

NAVSHIPS 0967-059-9010, Section 573-115-700

NAVSHIPS 0967-059-9020, Parts Manual

LAB II

JOB SHEET 2

ADJUSTMENTS

DIRECTIONS

Perform the following job steps in the order given. Observe all CAUTION notes

JOB STEPS

1. Read and Understand - Para 1.01 through 1.14, pages 5-7, Section 573-115-700, NAVSHIPS 0967-059-9010.
2. Perform - 2.25
3. Perform - 2.02(1)
4. Perform - 2.05
5. Perform - 2.06 (CHECK ONLY)
6. Perform - 2.07
7. Perform - 2.08
8. Perform - 2.09
9. Perform - 2.10
10. Perform - 2.15
11. Perform - 2.12
12. Perform - 2.13
13. Perform - 2.14
14. Perform - 2.16
15. Perform - 2.17
16. Perform - 2.18
17. Perform - 2.19
18. Perform - 2.20

LAB II

JOB SHEET 2

ADJUSTMENTS Cont'd

JOB STEPS

19. Perform - 2.21
20. Perform - 2.22
21. Perform - 2.23
22. Perform - 2.24(B)
23. Perform - 2.26
24. Perform - 2.27

STOP AND HAVE PRELIMINARY CHECK

NOTES: ANY CHANGE IN ITEM 2.27 WILL NECESSITATE A RE-CHECKING OF  
ADJUSTMENT NRS 2.28, 2.29, 2.31, 2.34 AND 2.36.



III. Adjustments for the Automatic Typewriter II

INTRODUCTION

The purpose of this job sheet is to guide you in performing selected adjustments in the Automatic Typewriter, required for preventive and corrective maintenance.

EQUIPMENT

AN/UGC-20 Teletypewriter Set

Standard Tool Kit

REFERENCES

NAVSHIPS 0967-059-9010, Section 573-115-700

NAVSHIPS 0967-059-9020, Parts Manual

LAB II

JOB SHEET 3

ADJUSTMENTS

DIRECTION

Perform the following job steps in the order given. Observe all CAUTION NOTES.

JOB STEPS

1. Perform - 2.28
2. Perform - 2.29
3. Perform - 2.30 (TAKE TENSION OFFCARRIAGE RETURN DRUM SPRING)
4. Perform - 2.31
5. Perform - 2.32
6. Perform - 2.35
7. Perform - 2.34
8. Perform - 2.36
9. Perform - 2.37
10. Perform - 2.39
11. Perform - 2.40
12. Perform - 2.43
13. Perform - 2.38
14. Perform - 2.46
15. Perform - 2.47
16. Perform - 2.48
17. Perform - 2.49
18. Perform - 2.50
19. Perform - 2.52

LAB II

JOB SHEET 3

ADJUSTMENTS Cont'd

- 20. Perform - 2.53
- 21. Perform - 2.54
- 22. Perform - 2.55
- 23. Perform - 2.57
- 24. Perform - 2.58
- 25. Perform - 2.67

STOP AND HAVE PRELIMINARY CHECK

NOTES: ANY CHANGE TO ITEM #1 WILL NECESSITATE A RE-CHECKING OF  
ITEMS 2 AND 8.

UNDER POWER PERFORM 2.02(2), 2.41, 2.51, 2.62, AND 2.69.

### LAB III

#### OBJECTIVES

When you complete this phase of instruction, you will be able to:

- I. Accurately interpret the applicable section of Tech Manual Navships 0967-059-9010, 573-115-701TC Lubrication Instructions
- II. Properly lubricate the AN/UGC-20, using correct lubricant and correct quantity as prescribed in the Lubrication section of the Tech Manual
- III. Replace oil felts and wicks.

#### MATERIALS

- I. Training Aids AN/UGC-20 Teletypewriter Set (one each trainee)
- II. References:
  - A. Navships 0967-059-901-, Section 573-115-701
  - B. Applicable EIB (as issued)
- III. Tools
  - A. Oil can (plastic with retractable spout)
  - B. Grease applicator
- IV. Expendable supplies
  - A. KS 7470 (oil)
  - B. KS 7471 (grease)
  - C. Wiping rags (paper, cloth impregnated)
  - D. Felts and Wicks (for needed replacement)

## LAB III

### INTRODUCTION

The purpose of this Job Sheet is to guide you in performing routine scheduled lubrication and to aid you in developing lubrication techniques, plus recognizing and replacing deteriorated felts and wicks.

### INFORMATION

There is one Job Sheet in this phase which covers lubrication of the AN/UGC-20 both oil and grease.

### DIRECTIONS

Follow the instructions of this Job Sheet carefully, paying close attention to Lubrication instructions in the Technical Manual. OBSERVE the condition of felts and wicks in each application.

**CAUTION:** WIPE OFF ALL EXCESS OIL AND GREASE UPON COMPLETION OF THIS JOB SHEET, AS EXCESS OIL AND GREASE CAN CAUSE UNWANTED COLLECTION OF DIRT AND DAMAGE MECHANICAL PARTS OF THE MACHINE. OIL DRIPPING INTO ELECTRICAL CIRCUITS CAN CAUSE OPENS IN THE ELECTRICAL PORTION OF THE MACHINE.

LAB III

PROCEDURES FOR LUBRICATION OF THE AN/UGC-20

I. PRELIMINARY INSTRUCTIONS

II. APPLICATION

I. Lubrication of the AN/UGC-20

INTRODUCTION

The purpose of this job sheet is to guide you in step by step lubrication of the AN/UGC-20 Teletypewriter Set.

EQUIPMENT

AN/UGC-20 Teletypewriter Set

Oil Can

Grease Applicator

REFERENCES

Navships 0967-059-9010, Section 573-115-701

TIME REQUIREMENTS

LAB III

JOB SHEET 1

LUBRICATION

DIRECTIONS

Perform the following job steps in the order given

Job Steps

1. Read and understand Para 1.01 through 1.10, sec 573-115-701, Navships 0967-059-9010
  
2. Perform lubrication steps Para 2.01 through 2.55 inclusive

- NOTES:
1. Observe condition of felts and wicks, replace if necessary
  2. Wipe off excess oil and grease
  3. Replace all lubricants in locker when through using them, do not leave oil cans or grease applicators on work bench